8EPR-SR

FIRST FIVE YEAR REVIEW REPORT

for

MINOT LANDFILL SITE

CITY OF MINOT, WARD COUNTY, NORTH DAKOTA

PREPARED BY:

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I. Introduction

The United States Environmental Protection Agency (EPA) Region 8 has conducted a five-year review of the remedial actions implemented at the Minot Landfill site (Site) in Minot, North Dakota. This review was conducted from January 25, 2000 through August 10, 2001. This report documents the results of the review. The report was prepared according to OSWER Directive 9355.7-03B-P, Comprehensive Five-Year Review Guidance, Draft, October 1999.

The purpose of five-year review is to determine whether the remedy being implemented at a site is protective of human health and the environment. The methods, findings, and conclusion of reviews are documented in five-year review reports. In addition, five-year review reports identify deficiencies found during the review, if any, and include recommendations to address them.

For sites where hazardous substances, pollutants or contaminants remain on-site, EPA must conduct five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA 121(c), as amended, states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial actions no less often that each five years after the initiation of such remedial actions to assure that human health and the environment are being protected by the remedial action being implemented.

The NCP part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR) states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The remedial action conducted at the Minot Landfill site left contamination on site above levels that allow for unlimited use and unrestricted exposure. The triggering date for the CERCLA mandated statutory five-year review is the date of the RA Onsite construction began, as documented in EPA's WasteLAN database: June 25, 1996. This Report, therefore, is the first five-year review for the Minot Landfill site.

II Site Chronology

Table 1: Chronology of Site Events

Event	Date
Initial Discovery	June 17, 1985
Removal Assessment #1	August 30, 1990
Removal Assessment #2	April 20, 1992
PRP Removal	July 18, 1990
Proposed for NPL Listing	June 24, 1988
Listed on Final NPL	March 31, 1989
RI/FS Complete	June 21, 1993
ROD signature	June 21, 1993
Explanation of Significant Differences	April 10, 1996
Remedial Design Complete	April 26, 1996
Remedial Action Start	January 23, 1996
RA Onsite	June 25, 1996
Preliminary Closeout Report	September 23, 1996
Final Closeout Report	December 2, 1996
Notice of Intent to Delete	December 26, 1996
Notice of Deletion	April 1, 1997

III. Background

The Minot Landfill Site (Site) is a closed waste disposal facility located in Section 27, Township 155 North, Range 85 West, approximately one mile southwest of downtown Minot in Ward County, North Dakota. (Note that the Site is known locally as the "Old Minot Landfill") The Site is situated approximately 2000 feet south of the Souris River and is located to the east of the intersection of Burdick Expressway and the combined U.S. Highways 2 and 52 Bypass. The fill area that received municipal and industrial waste covers approximately 26 acres. Land use in the vicinity of the Site is light industrial and residential, with areas southwest of the Site used for agriculture. The remedial action included provisions for Institutional Controls to prevent casual access to the Site and to prevent any future use of groundwater. These restrictions were put in place in accordance with the *City of Minot, ND, Institutional Controls/City Ordinance No. 3406,* November 4, 1996.

There is a trailer park located across the highway from the landfill. The closest residence to the landfill is a trailer located approximately 500 feet northeast of the landfill. The City of Minot has not had any complaints regarding the landfill from the residents of this trailer park these past five years. A new skating rink, which was completed in 2000, is located 500 feet from the landfill fence line and 1000 feet from the northwest edge of the landfill. Hay has been harvested from the landfill cap and adjacent area a few times over the past five years.

The Site was used to dispose of municipal and industrial waste between 1961 and 1971. The Landfill was operated by the City of Minot. An estimated 75 tons/day of waste was placed in the Landfill during its operation. The exact composition of the wastes disposed is not known. Discussions with past Landfill operators indicate that refuse was received from the City of Minot, other neighboring towns, farms, industries, and military sites. In addition, the Landfill likely contains arsenic-contaminated soil and residues, and solvents used in a variety of local industrial applications.

Chemicals of Concern: Benzene and Compounds - benzene, toluene. Halogenated Aliphatics - bromomethane, bromodichloromethane, t-1,2-dichloroethene, methylene chloride, tetrachloroethene, vinyl chloride. Inorganics - arsenic, barium, chromium, copper, cobalt, lead, nickel, vanadium, zinc. Phenol and Compounds - benzoic acid, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, di-n-butylphthalate, diethylphthalate, di-n-octylphthalate, 4-methylphenol, phenol. Polycyclic Aromatic Hydrocarbons - benz{a}anthracene, benzo{a}pyrene, ideno{1,2,3-cd}pyrene, 2-methylnaphthalene, naphthalene, phenanthrene. Solvents - Acetone. Others - aroclor 1254.

In 1989, Removal Actions were initiated by the City of Minot. These Removal Actions consisted of the installation of a perimeter fence around the Landfill, construction of surface runoff/erosion control (including swales and storm sewer piping), and seeding of areas disturbed by construction and exposed slopes on the hills located along the southern

edge of the Site. In 1990, additional work to repair drainage ditches and swales was performed to complete the Removal Actions. Additional information regarding these response actions can be found in the *Final Inspection, Old Minot Landfill Removal Action (OSC Report),* July 1990 and the *Final Polrep Old Minot Landfill, Minot, North Dakota,* July 1991.

The Site was placed on the National Priorities List (NPL) in 1989.

A Baseline Risk Assessment (BRA), entitled *Risk Characterization Baseline Risk Assessment, Old Minot Landfill Superfund Site, Minot, North Dakota,* January 1992, was completed to evaluate human health risks in the absence of any remedial action. The chemicals of concern were utilized in the BRA. Contaminated media that were quantitatively evaluated in the risk assessment were: groundwater (including leachate), surface water, soil, sediment, and landfill gases. The potentially exposed receptors who were evaluated in the BRA were adult residents and occupational workers that live or work at or in the vicinity of the Site, and active children between 3 and 12 years who live or play within the vicinity of the Site.

In summary, the evaluation performed in the BRA was based on a hypothetical exposure of both adults and children to groundwater, surface water, surface soil, sediment, and landfill gases. Under this scenario, the probability that an adult would develop cancer from exposure to this site exceeds the national average 1 in a 100. For a child, the excess cancer risk from landfill gases would be 1 in 5000.

Sampling and field studies were conducted by the City of Minot in order to characterize the contamination at and from the Site. Results were provided in a report entitled *Remedial Investigation Report, Old Minot Landfill Superfund Site, Volumes 1 through 4*, February 1992. Once the contamination was characterized, an evaluation was made of the remedial measures that would be available to achieve cleanup goals. This evaluation is contained in the *Draft Feasibility Study Report, Old Minot Landfill Superfund Site*, November 1992 completed by the City of Minot.

A geophysical survey, a borrow source investigation and aerial surveying were performed in April and May, 1993. The geophysical survey was completed to further define the horizontal and vertical extent of the wastes in the Landfill. Findings are included in a report entitled *Geophysical Survey Investigation, Old Minot Landfill,* May 1993. The borrow source investigation was performed to determine if the clay borrow area on the City of Minot property to the east of the Landfill was an adequate source of material for cap improvements. An aerial survey was performed to provide the topography for the Landfill after the 1989 and 1990 improvements were completed. The aerial survey was performed by contractors to the City of Minot.

The Remedial Investigation (RI) Report, as completed in 1992, identified and evaluated hydrogeologic conditions, primary contaminant sources, release mechanisms, migration

pathways and receptors. The investigation was designed to find and evaluate the most likely flow path for the contaminants. The following conclusions were derived from the RI Report:

- Contaminants were detected in leachate in the Landfill, in landfill gas, in soil at the location of a leachate seep and in one groundwater monitoring well located immediately adjacent to the Landfill.

- Both the physical and chemical data indicate that there has been no significant migration of contaminants away from the Site within the groundwater system.

- Uncontrolled release of contaminants at low levels does occur from leachate seeps and landfill gas release.

- Leachate seeps and gas releases have been identified at the surface within the fill boundaries of the Landfill.

- Site geologic conditions consisting of clay till and discontinuous sand lenses minimizes the potential for leachate migration to the surrounding groundwater system.

- The leachate is in hydraulic contact with the groundwater flow system; therefore, measures to minimize the potential for future release and continued monitoring of groundwater should be considered in the Feasibility Study (FS).

- The BRA states that there is insignificant current risk to receptors. However, risks could be outside of EPA acceptable risk range if a remedy (land use controls at a minimum) is not implemented.

- Sufficient data have been obtained to proceed with the FS

Once the contamination was characterized, an evaluation was made of the remedial measures that would be necessary to achieve cleanup goals. This evaluation and the cleanup goals are contained in the Feasibility Study completed in 1992 by the City of Minot.

IV. Remedial Actions

A. Remedy Selection

The *Record of Decision (ROD), Minot Landfill, ND,* dated June 21, 1993, addresses the potential threats to humans and the environment resulting from future migration of leachate and gas emissions from the Old Minot Landfill Superfund site.

The major components of the remedy as stated in the Declaration for the ROD included:

- Institutional controls to prohibit construction on the Landfill, or the use of water beneath the Landfill or in the immediate vicinity of the Landfill for drinking water purposes.

- Leachate extraction and treatment in the City of Minot wastewater treatment facility.

- Consolidation of contaminated soil in the vicinity of leachate seeps under the cap, and cap improvements to limit precipitation infiltration and control stormwater runoff.

- Groundwater monitoring to allow detection of future releases of contaminants to the groundwater.

- Landfill gas collection using an active collection system and a tall stack for dispersion venting. EPA may modify the system design to accommodate Site conditions, following installation of the leachate collection system.

An *Explanation of Significant Differences (ESD) for the Old Minot Landfill Superfund Site*, dated May 2, 1996, contained the following modifications to the ROD:

- A passive gravity drain system will replace the proposed active leachate extraction system. The passive system will be more cost effective while achieving the same goal of managing leachate levels in the Landfill to prevent leachate seeps through the cap and to reduce the potential for leachate migration from the Landfill into the groundwater.

- To clarify the cap design, the 3-foot clay cap specified in the ROD performance standard will actually be 18 inches of clay, 12 inches of root zone material, and 6 inches of topsoil.

- Passive gas vents will replace the proposed active gas extraction system and tall stack. The gas vents will be more cost effective while achieving the same goal of controlling Landfill gas to reduce pressures in the Landfill that can damage the Landfill cap and can increase the potential for leachate migration.

- The limits of buried waste have been extended based on geophysical survey investigation information (May 1993).

B. Remedial Design

The Remedial Design for the Site was started on January 23, 1996 and completed on April 26, 1996. The design included:

- Provisions for Institutional Controls to prohibit construction on the Landfill or the use of water beneath the Landfill or in the immediate vicinity of the Landfill for drinking water purposes.

- Leachate extraction and treatment in the City of Minot's wastewater treatment facility using a passive gravity drain system to manage leachate levels in the Landfill to prevent leachate seeps through the cap and to reduce the potential for leachate migration from the Landfill to the groundwater.

- Consolidation of waste and contaminated soil (both from the north end of the Landfill and in the vicinity of leachate seeps) under the cap, and cap improvements to limit precipitation infiltration and control stormwater runoff.

- Groundwater monitoring to allow detection of future releases of contaminants to the groundwater.

- Passive Landfill gas venting to control Landfill gas to reduce pressures in the Landfill that can damage the Landfill cap and can increase the potential for leachate migration.

C. Remedial Action

- As a result of the 1993 geophysical survey, waste was discovered outside of the existing fence along the southern boundary of the Landfill. Therefore, prior to the start of Remedial Action (RA), a one-day test pit investigation was performed in March 1996 to estimate the quantity of waste outside the existing fence in order to evaluate the protectiveness and cost effectiveness of excavating the waste versus

moving the fence. It was determined that moving the fence was more cost-effective action and achieved the same level of protection as excavating and relocating the waste inside the existing fence. In the southern area, the fence was moved to enclose the waste.

- The 1993 geophysical survey also indicated an area of waste on the north side of the Site, outside the fence. In July 1996, several test pits were excavated in order to verify the presence and determine the configuration of this waste. It was decided that moving the waste from the area outside the fence was the most cost-effective approach, since it achieved the same level of protection as moving the fence. The waste was excavated from the North End Waste Removal Area and placed in a containment area within the Landfill. The final location of the permanent fence completely encompasses the final waste limits.

- The RA started on June 3, 1996. The total area where the original cap was found to be inadequate was larger than originally estimated in the ROD. The existing cap was improved so that a uniform, minimum thickness of capping material existed everywhere over the Landfill. The cap installed consisted of, from bottom to top, 18 inches of clay, 12 inches of loosely placed root zone material, and a 6 inch layer of topsoil. This meets the substantive requirements of the North Dakota Solid Waste Management Act to prevent direct contact with Landfill contents.

- The existing silt fence around catch basins was replaced by riprap. Additionally, erosion matting was installed in the swales between catch basins, in the perimeter ditches, and in the cap improvement area in the swale adjacent to 18th Street. Silt fences will be removed after vegetation becomes established during Operations and Maintenance (O&M) activities.

- Leachate within the Landfill is being drained by gravity into a drain pipe system located approximately eight feet below the surface of the Landfill. The slope of the drain system is from the south to the north, where the leachate discharges into a sanitary sewer system. From there, the sanitary sewer system carries the leachate into the City of Minot waste water treatment facility, where it is ultimately treated. Riser pipes extending upward from the leachate drain serve as passive gas vents and clean-outs.

- Seven groundwater monitoring wells and four piezometers have been constructed around the perimeter of the Landfill. Thirteen wells that were no longer needed were abandoned in accordance with North Dakota Department of Health (NDDH) regulations. Leachate in the wells during abandonment was disposed into the municipal sanitary sewer system.

- EPA and the North Dakota Department of Health (NDDH) conducted a preliminary final inspection on August 27, 1996. NDDH conducted the final inspection on September 18, 1996. EPA and NDDH concluded that the Remedial Action had been successfully implemented.

- The City of Minot passed restrictive covenants, implementing the institutional

controls on November 4, 1996. (City Ordinance No. 3406, November 4, 1996) These institutional controls are effective to restrict access to the Site and prevent the use of Site groundwater.

Additional information about the Remedial Action can be found in a report entitled *Remedial Action Completion Report, Minot Landfill Superfund Site, Final Report,* November 1996. Additional information about the O & M activities can be found in a report entitled *Monitoring Operations and Contingency Plan (Final)*, October 1996.

D. Demonstration of Quality Assurance/Quality Control (QA/QC) for Cleanup Activities

Activities at the Site remain consistent with the ROD, and all work plans were issued to contractors for design and construction of the RA, including sampling and analysis. The RD Report, along with the Quality Assurance Project Plan (May 1996) and Monitoring Operations and Contingency Plan (MOCP) (May 1996), incorporated all EPA and State of North Dakota quality assurance and quality control (QA/QC) procedures and protocol. EPA analytical methods were used for all validation and monitoring samples during RA activities. Sampling of soil and water followed EPA protocol *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods,* as detailed in Specifications for Construction Quality Assurance/Quality Control Plan section of the Remedial Design. The Remedial Action Closeout Report contains documentation of sampling results.

The QA/QC program used throughout the RA was rigorous and in conformance with EPA and State standards; therefore, EPA and the State determined that all analytical results are accurate to the degree needed to assure satisfactory execution of the RA and are consistent with the ROD and the RD plans and specifications.

E. Operation and Maintenance

Seven groundwater monitoring wells and four piezometers are located around the perimeter of the Landfill. The groundwater wells were sampled quarterly for the first year after the RA Construction Completion and annually thereafter, in accordance with the ROD. The frequency of sampling is always subject to revision according to sampling results. Alan Walter, Public Works Director for the City of Minot provided the oversight of the RD/RA and managed the contract with Wenck Environmental Engineers, to prepare the RD, for the City of Minot. Remedial Action started on June 3, 1996, with the contract award to Excavating, Inc. The RA was completed by September 18, 1996.

Leachate within the Landfill is being drained by gravity into drain pipe located approximately eight feet below the surface of the Landfill. The drain discharges the leachate to a sanitary sewer system which carries it to the City of Minot wastewater

treatment facility. Riser pipes extending upward from the leachate drain serve as passive gas vents and cleanouts. This system continues to be operated and maintained by the City of Minot, ND.

Most of the stormwater from the Landfill is routed to catch basins, from which it flows off-site via storm sewers. A six feet high security fence, with locked gates, surrounds the Landfill.

Maintenance of the Landfill is detailed in the Monitoring Operations and Contingency Plan (MOCP). The objectives of the MOCP are to: 1) describe the groundwater monitoring program required by the ROD (Monitoring Plan); 2) describe the operations of the Remedial Action and act as an operations and maintenance (O&M) manual (Operations Plan); and 3) describe additional response actions (or contingencies) that may be necessary to meet the performance standards (Contingency Plan). Inspections and maintenance work, detailed in the MOCP, are the responsibility of the City of Minot.

V. Five -Year Review Process

The Minot Landfill five-year review was performed by Erna Waterman, Remedial Project Manager for the Minot Landfill site. Barry Levene, Team Leader for the Superfund Program, assisted with the interviews and participated in the Site visit performed on September 19, 2000. The City of Minot hired Water Supply, Inc. (WSI) as consultants for groundwater and leachate monitoring. The information provided by WSI was provided to EPA and the State of North Dakota in a transmittal letter dated July 23, 2001 from Alan M. Walter, Director of Public Works, City of Minot, ND. Rich Muza, EPA Hydrologist, assisted in review of this monitoring data and report. In addition, David Glatt and Kevin Solie from the State of North Dakota Department of Health reviewed the reports. A copy of Alan Walter's transmittal letter dated July 23, 2001, and the Water Supply, Inc. transmittal letter dated July 17, 2001(w/o Attachments) are included as Appendix B.

Mr. Alan Walter, Director of the City of Minot Public Works and Maintenance manages the oversight of the Landfill. The State of North Dakota continues to monitor this oversight and maintenance.

VI. Five - Year Review Findings

A. Interviews

The following individuals were interviewed for the five-year review.

- Alan Walter, City of Minot, ND

- David L. Glatt, and Kevin Solie from the Department of Health, State of North Dakota

See Appendix A - Site Visit and Interviews

B. Site Inspection

A visual inspection of the landfill cap was performed. The vegetative cover is fuller and more robust than when it was initially constructed and there are no longer any surface seeps. The leachate collected in the landfill drain system is minimal and continues to be handled as planned. The landfill gas continues to be limited as well. Overall, the remedy continues to operate and function as planned. The remedy is still protective.

See Appendix A - Site Interviews and Inspection

C. Risk Information Review

1. The Remedy as detailed in the ROD/ESD is functioning as intended.

2. There has not been any change in exposure pathways. The Remedial Action performed at the Old Minot Landfill Site remains protective of human health and the environment.

3. There is little or no change in toxicity and/or other contaminant characteristics.

4. The risk assessment methodologies are adequate for the existing Site.

5. The remedy remains protective and has been protective for the past five years. New information regarding the landfill itself, the adjacent land use, and ground water monitoring results do not call into question the protectiveness of the remedy.

D. Data Review

Water-quality data are available for the seven monitoring wells and the leachate collection system; quarterly sampling was performed from December 1996 to September 1997 followed by annual sampling (each June) to present. The leachate samples had detections

of benzene (0.6-11.3 ppb), toluene (2.2-27 ppb), t-1-2-dichloroethene (ND-2.3 ppb), vinyl chloride (18.6-275.8 ppb), barium (64-1200 ppb), copper (ND-100 ppb), and zinc (ND-410). The detected barium, copper and zinc present in monitoring wells could be artifacts of pre-remedial action contamination and has declined over time with the exception of copper. All levels for copper and zinc detected in the monitoring wells for are significantly below the Secondary Maximum Contaminant Level (SMCL) standards [40CFR 143.3]. The barium concentrations are significantly below the MCL and MCLG for barium [40CFR 141]. Monitoring data shows that the passive gravity drain system for leachate collection is effective in containing the leachate produced to that the impacts to the underlying ground water are minimized. In addition, Erna Waterman inspected the passive gas venting system and found it to be functioning as designed. The gas emitted from the landfill was minimal.

VII. Assessment

Land use in the vicinity of the Site is light industrial and residential with some area used for agricultural. The RA included provisions for Institutional Controls to prevent casual access to the Site and to prevent any future use of groundwater. The Institutional Controls, combined with landfill capping and passive gas vents, minimize the potential exposure of humans to waste materials and/or landfill off-gasses. The passive gravity drain system manages leachate levels in the landfill to reduce the potential for leachate migration into the groundwater. Groundwater monitoring data suggest that this system is effective in meeting this goal. Based on the Site inspection and the monitoring data, the remedy is protective of human health and the environment.

VIII. Deficiencies

No additional modifications or improvements to the remedy are required at this time.

IX. Recommendations and Follow-up Actions

EPA will continue to monitor the Site in the future through coordination with the North Dakota Department of Health. The Department of Health will continue to be the lead Agency and may prepare the next Five Year Review Report. No additional actions are

needed at this time.

X. Protectiveness Statements

There continues to be no threat to the community from the landfill, the landfill gas or the leachate. Institutional controls for this Site have been adopted and are protective of human health and the environment.

XI. Next Five-Year Review

Hazardous substances remain at the Minot Landfill Site above health-based levels after completion of the remedial action. Pursuant to CERCLA § 121(c), NCP 40C.F.R. § 300.400(f) (4) (ii); OSWER Directive 9355.7-03B, *Comprehensive Five-Year Review Guidance*, Draft, October 1999, EPA Region VIII must conduct a statutory five-year review. The Second Five-Year Review Report will be completed prior to the end of the third quarter of 2005 (five years after the First Five-Year Review.)

XII Other Comments

We appreciate the support from the City of Minot and from the State of North Dakota in preparing this report.

Appendix A - Interviews and Site Visit

This section is not available online. Contact:

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Appendix B - Water Supply, Inc. Report

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